



GEOLOGIC RESOURCE MONITORING PARAMETERS

Wind Erosion



Brief Description: The action of wind on exposed sediments and friable rock formations causes erosion (abrasion) and entrainment of sediment and soil particles [see dust storm magnitude, duration and frequency]. Eolian action also forms and shapes sand dunes, yardangs (streamlined bedrock hills) and other landforms. Subsurface deposits and roots are commonly exposed by wind erosion. Wind can also reduce vegetation cover in wadis and depressions, scattering the remains of vegetation in interfluvies. Stone pavements may result from the deflation (removal) of fine material from the surface leaving a residue of coarse particles. Blowouts (erosional troughs and depressions) in coastal dune complexes [see dune formation and reactivation] are important indicators of changes in wind erosion. The potential for deflation is generally increased by shoreline erosion or washovers, vegetation die-back due to soil nutrient deficiency or to animal activity, and by human actions such as recreation and construction.

Significance: Changes in wind-shaped surface morphology and vegetation cover that accompany desertification, drought, and aridification are important gauges of environmental change in arid lands. Wind erosion also affects large areas of croplands in arid and semi-arid regions, removing topsoil, seeds and nutrients.

Environment Where Applicable: arid and semi-arid lands

Types Of Monitoring Sites: Dune fields, coastlines, desert surfaces

Method Of Measurement: Field observations, aided by airphotos and field surveys. Changes in vegetation cover can be monitored using historical records, sequential maps, air photos, satellite images, and by ground survey techniques.

Frequency Of Measurement: Every 5-20 years

Limitations Of Data And Monitoring: The effect of wind erosion on different rock types and landforms (with contrasted aerodynamic shapes) varies, so that it is not easy to assess the degree of erosion of a complex landscape.

Key References:

Abrahams, A.D. & A.J.Parsons 1994. Geomorphology of desert environments. London: Chapman and Hall.

Cooke, R., A.Warren & A.Goudie 1993. Desert geomorphology. London: UCL Press.

Lancaster, N. 1996. Geoindicators from desert landforms. In Berger, A.R. & W.J.Iams (eds). Geoindicators: Assessing rapid environmental changes in earth systems. :251-268. Rotterdam: A.A. Balkema.

Related Environmental And Geological Issues: Degradation of agricultural land, desertification.

Overall Assessment: Wind erosion is a valuable indicator of environmental change in arid and semi-arid regions.

Source: This summary of monitoring parameters has been adapted from the Geoindicator Checklist developed by the International Union of Geological Sciences through its Commission on Geological Sciences for Environmental Planning. Geoindicators include 27 earth system processes and phenomena that

are liable to change in less than a century in magnitude, direction, or rate to an extent that may be significant for environmental sustainability and ecological health. Geoindicators were developed as tools to assist in integrated assessments of natural environments and ecosystems, as well as for state-of-the-environment reporting. Some general references useful for many geoindicators are listed here:

Berger, A.R. & W.J.Iams (eds.) 1996. Geoindicators: assessing rapid environmental change in earth systems. Rotterdam: Balkema. The scientific and policy background to geoindicators, including the first formal publication of the geoindicator checklist.

Goudie, A. 1990. Geomorphological techniques. Second Edition. London: Allen & Unwin. A comprehensive review of techniques that have been employed in studies of drainage basins, rivers, hillslopes, glaciers and other landforms.

Gregory, K.J. & D.E.Walling (eds) 1987. Human activity and environmental processes. New York: John Wiley. Precipitation; hydrological, coastal and ocean processes; lacustrine systems; slopes and weathering; river channels; permafrost; land subsidence; soil profiles, erosion and conservation; impacts on vegetation and animals; desertification.

Nuhfer, E.B., R.J.Proctor & P.H.Moser 1993. The citizens' guide to geologic hazards. American Institute for Professional Geologists (7828 Vance Drive, Ste 103, Arvada CO 80003, USA). A very useful summary of a wide range of natural hazards.